

Community Assistantship Program

**Farm-to-School in Central Minnesota – Applied
Economic Analysis**

Prepared in partnership with
Region Five Development Commission

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December, 2009

CAP Report 144

December 2009

CAP is a cross-college, cross-campus University of Minnesota initiative coordinated by the Center for Urban and Regional Affairs.

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Farm-to-School in Central Minnesota – Applied Economic Analysis

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Introduction

The farm-to-school model was created in the 1990s, as a result of two seemingly unrelated public programs. The first was an initiative started by the USDA in Florida, designed to help local farmers by establishing schools as a potential market for certain crops. The second was a pilot program at a low-income school in California which focused on school food issues (Valliantos, et al, 2004). Since then, the farm-to-school movement has spread throughout the country. Today, forty-one states have operational farm-to-school programs, and over two thousand such programs exist in the United States (National farm-to-school website).

Farm-to-school advocates cite several types of positive effects from these programs. Healthier meals in schools can positively impact students' weight, improve behavior, and reduce food insecurity. Farm-to-school programs also teach students about where their food comes from, local agriculture, and healthy diets. Advocates note that, by concentrating school food expenditures in the local economy, farm-to-school programs may have broader economic impacts that go beyond these more direct effects. While there is a growing body of literature that measures impacts of farm-to-school programs on student health and student learning, very little research has been done to measure the economic impact that farm-to-school has had on surrounding communities.

This study collects data required for a formal analysis of the these broader community economic impacts of farm-to-school programs in the Region Five Development District located in Central Minnesota. More specifically, we estimate the potential demand for locally produced food products from farm-to-school programs, and we assess the ability of local farmers to meet that demand. We also investigate the prices

schools currently pay for products that could be supplied locally and the prices farmers would require to supply those products. Finally, we develop new sector descriptions and modeling assumptions that will be needed to conduct a formal economic impact assessment with an input-output model.

Region Five

The Region Five District, located in North Central Minnesota, is home to Cass, Crow Wing, Morrison, Todd, and Wadena counties. The Region Five Development Commission is a political subdivision devoted to assisting local governments, development organizations and community leaders in Central Minnesota who are working to build and improve their communities. The mission of the Region Five Development Commission is to provide high quality, professional planning and development services through collaboration, assistance and coordination with local units of government, organizations, and citizens (Region Five website).

The results of this study will be of interest to public officials and citizens in the Region Five District as they consider policies to promote farm-to-school programs. If farm-to-school projects provide a positive economic impact to the region, they might lead the way for other endeavors such as sales to local restaurants, hospitals, or resorts. We also believe this report will be of more general interest, since it will demonstrate the data needs and analytical methods required to analyze the economic impacts of farm-to-school programs in other settings.

Previous Research

In recent years, much research has been devoted to the farm-to-school phenomenon. As more and more schools have taken the plunge to buy from local farms, interest in the effects this trend is having on students, schools, farmers and communities has increased. Various surveys and studies around the country have examined different aspects of farm-to-school projects. We will first look at the available research on farm-to-school programs throughout the United States, from the impacts it has had on students to the policy effects both regionally and nationally. In addition, we will examine some economic studies related to the farm-to-

school issue. We will discuss strengths and weaknesses, as well as lessons that can be applied to our own research and areas of research that warrant future examination.

Student Impacts

The amount of research devoted to the impact that farm-to-school programs have had on students is extensive. In their recent report, “Bearing Fruit”, Joshi and Azuma summarize much of the research on student impacts, and organize the findings into the following categories: changes in student knowledge, changes in student attitude, and changes in student behavior. The results, in general, are overwhelmingly positive. Three of the studies in their report (Croom and Kolodinsky, Triant and Ryan, and Joshi and Beery) show marked improvements in students’ attitudes about new foods and their willingness to try such foods. They list four studies (The Edible Schoolyard, Joshi and Azuma, The Food Trust, and Triant and Ryan) which show an increase in student knowledge of gardening and agriculture, healthy eating habits, different food sources, and foods grown in the region. Most impressive are their findings on changes in student behavior. Seven studies show that students participating in a farm-to-school program are more likely to choose the fresh fruits and vegetables over the hot lunch option. What’s more, some of these studies actually show an increase in school lunch participation rates due to the farm-to-school program.

Teacher Impacts

Many farm-to-school programs have shown success incorporating the project outside of the lunchroom. The majority of teachers who integrate lessons complementing the farm-to-school mission (i.e. food, farm, and nutrition issues) find the curriculum useful, and say that they would participate again if offered the chance (Joshi and Azuma). These teachers see an increase in students’ awareness of food and nutrition issues, and many feel that the lessons will impact the students’ long-term choices regarding food and nutrition. What’s more, many teachers involved in the program actually see an improvement in their own diets as well.

Some difficulties can arise, however, when enthusiastic teachers face active or passive resistance on the part of their leadership. One study in Wisconsin faced with this problem makes the following recommendation:

“In retrospect, it would have been useful to have arranged for external allies – parents, PTOs, school board members – to more forcefully express a set of goals and expectations complementary to those of WHL staff. Such reinforcement might have been sufficient to induce the food service to have pursued proposed changes more vigorously.” (Kloppenburger, et al, 2008)

Food Service Impacts

The greatest impacts of a farm-to-school program are felt within the lunchroom. This is where the success or failure of the project is felt most acutely. Consequently, much research has been done on the effects that farm-to-school programs have had on food service costs, participation rates, and employees. Some of the positive effects include a greater variety and quantity of fruits and vegetables and an increase in the percent of recommended daily servings for fruits and vegetables. One California study shows that students participating in the farm-to-school program are served between 107% and 177% of the recommended daily servings of fruits and vegetables (Feenstra and Ohmart, 2005). However, some of the impacts on school food service operations are more mixed. Overall, the price for farm-to-school products has been found to be higher than products purchased from local distributors. While the comparison between the wholesale and retail prices of specific ingredients is not overwhelming, the higher labor costs necessary to prepare the fresh ingredients are significant (Joshi and Azuma). This poses a difficult problem because typically, school food service operations are not supported by school district general funds, and are required to generate their own funds. Some schools require an initial investment to cover the cost of processing equipment necessary for the fresh produce (Christensen, 2003). Other schools, however, are able to cover the additional costs through increased participation rates (Joshi and Azuma). Surely, the food service impacts will continue to be a major focus of future research, as the greatest benefits and most difficult challenges are found here.

Farmer Impacts

Little research has been done on farm-to-school's impact on farmers. The few studies that have looked at farmer impacts have found mixed results. Although most of the farmers involved with farm-to-school

programs are “dedicated to the idea of the farm to school approach and were passionate about the philosophical underpinnings of the program” (Ohmart, 2002), the total revenue that farmers gain from their involvement with farm-to-school is small. One study finds that for most growers, the school account represents less than 5% of total income (Feenstra and Ohmart, 2005). As a whole, most farmers typically report that the sales for the farm-to-school programs rarely exceed 10 percent of their income (Joshi and Azuma). Much more research is needed before we can determine the potential benefits that farm-to-school might have on small farmers.

Feasibility Studies

A number of feasibility studies have been done prior to implementing farm-to-school projects in order to assess the viability of the project and the level of interest among potential participants in the program. Joshi and Azuma examine nine such studies, and found several common themes. Overall, there is a very high interest in purchasing local ingredients. Schools and other institutions everywhere from Michigan to San Francisco cite numerous reasons for their interest, including wanting to support the local economy, better access to high quality foods, and increasing students’ fruit and vegetable consumption. However, these same studies find some common concerns among potential participants as well. Some of these concerns include price, food safety, adequate supply, reliability of products, lack of available producers, changes in delivery patterns, and the availability of seasonal products. Hence, the overall consensus among potential participants is one of great interest, as long as price and quality are comparable to the product they currently receive from local distributors.

Policy Impacts

Little research has been done regarding the policy impacts of farm-to-school programs, but certain policy changes have been made in response to farm-to-school. Some of the school district policy changes include the preferential purchasing of local foods when possible, support for nutritional education and/or school gardens, and stricter standards for foods offered in schools. On a broader scale, seventeen states around the

country have enacted policies related to either local foods or farm-to-school programs, encouraging the use of healthy local alternatives through grants, mandates, and other similar policies (Joshi and Azuma).

Research in Minnesota

Recently, the Minnesota School Nutrition Association (MSNA) and the Institute for Agriculture and Trade Policy's (IATP) funded a study called "MN School Food Service Director Survey: Farm to School". This project assesses the interest in farm-to-school among Minnesota's food service directors, and examines the feasibility of implementing a farm-to-school program in the state of Minnesota. The survey asks various questions about the capability of food service operations to prepare and store fresh produce on site, the ability of food service staff to handle and prepare fresh ingredients, information about vendors and distributors, and the food service directors' experiences with local foods in general. The findings from this study proved to be very useful for our research. In particular, information on the availability of on-site kitchens throughout the state, numbers on the amount of students enrolled in school lunch programs on a school by school basis, and pricing information proved to be very useful for our analysis. We will discuss these findings in more detail later in the report.

Local Economic Impacts

Little research has focused on farm-to-school's impact on the surrounding community, and the economic effects that it has on the local economy. While not entirely related to the farm-to-school issue, two studies attempt to quantify the economic impacts that increased local fruit and vegetable production would have on a state's economy. The information gathered from these studies can be beneficial for farm-to-school advocates looking for examples of positive economic benefits from increased local production. In his 2006 study, Swenson looks at four hypothetical scenarios for the state of Iowa. Each scenario assumes increased production on the part of local Iowa farmers, in order to meet the demands of the state. Different marketing techniques are tested, and one scenario requires that all Iowa residents consume the recommended daily intake of fruits and vegetables. The total economic output of such a policy would range from \$139.9 million

(for the most modest scenario) to well over \$450 million (for the most ambitious), and employment impacts range from 2,032 new jobs to over 6,000.

In 2008, Conner and colleagues conducted a similar study, this time in Michigan. Like the Iowa study, Conner examines what the economic impacts of increased fruit and vegetable production in Michigan would be, if all the state's residents met their daily requirements for fruits and vegetables based on USDA guidelines. Using input-output analysis, he finds that the changes discussed above would result in a net increase of 1780 jobs and a total net increase of \$211 million in income within the state. Increased sales in fruit would result in 529 jobs and \$42.4 million in income; vegetables sales account for 1251 jobs and \$169.1 million.

Both studies show how great the potential for increased fruit and vegetable sales is, and how local food systems can potentially be great economic drivers. However, some flaws should be addressed if they are to be used as models for further research. For instance, Conner reports all outputs in "income within the state". In other words, he is measuring total sales rather than income to the farmer. These total sales figures can be misleading. While vegetables generate greater revenue than corn or soybeans (Conner assumes much of the new vegetable production comes from land currently used for these crops), they also cost much more to produce. Total output measured in income to the producer is much more meaningful, because it takes these additional costs into consideration (Crompton, et al.). Hypothetical economic impact scenarios such as Swenson and Conner's can help from a technical standpoint, but it is also important to consider the real difficulties that face farmers and consumers when buying and selling local products, and how these difficulties can affect potential economic impacts.

Much more research is needed on the economic effects of farm-to-school programs, however. In their 2008 study, Carlsson and Williams recommend further research on the following issues: the full economic potential of purchasing locally, a full cost/benefit analysis of food transportation, and the implications of a regional buy local policy on supply and demand, among others. We hope that our study on farm-to-school's potential economic impacts will be of use to both policymakers and future researchers, and will partially fill the gap that remains in the current literature.

Barriers to Farm-to-School

While farm-to-school's potential benefits are great, it is important to mention some of the barriers that face these projects. Without an honest look at the difficulties farm-to-school programs face, as well as measures that can be taken to overcome these barriers, it is impossible to improve future farm-to-school projects. One of the most common barriers in farm-to-school projects is pricing. Due to strict budgetary constraints, most schools surveyed say that they would be willing to purchase local products only if price was comparable (Vallianatos, et al, 2004, Kloppenburg et al 2008). However, Joshi and Azuma find that in most cases, the farm-to-school lunches cost significantly more than the traditional hot lunch option, ranging from \$0.13 to \$0.80 more per meal. There are ways to combat this problem, however. Some schools see increased participation in the school lunch program, especially among teachers and administrators, due to the farm-to-school project. This combined with the fact that the adults pay a higher price for their meals, helps cover the higher cost of ingredients (Joshi and Azuma).

Another barrier that has come up again and again during our research has been that of distribution. Food service directors currently enjoy the convenience of working with a small number of distributors, and are hesitant to move toward a less structured system. Working with many growers requires more work on the part of the food service employees, from coordinating delivery schedules to paying multiple invoices. A possible option for removing this barrier is incorporating local foods into the traditional distribution channels; either by having growers sell their product to distributors, or by incorporating some sort of farmer cooperative. One benefit of distributing via a cooperative rather than selling to local distributors is cost. A cooperative allows farmers to retain a competitive price while still giving the schools the convenience of consolidated deliveries and billing.

In addition, Kloppenberg finds a variety of obstacles that have not so far been raised in the FTS literature. In their 2008 study, Kloppenburg and colleagues examine the Wisconsin Homegrown Lunch program, located in the Madison area. While the WHL staff expected the primary problems of local sourcing would be pricing, brokering, and seasonality, they instead found that almost every aspect of incorporating locally sourced foods

into school meals required some deviation from the food service's established practices. Though the WHL staff identified a range of impediments, they cluster around three central concerns: cost (schools are under strict budgets, while prices of sustainable/organic produce are high), procurement (institutional buyers prefer to deal with few vendors to maximize the efficiency of ordering and delivery), and supply (farmers need to provide sufficient volumes of product consistently over the seasons in ready-to-use form). Much can be learned from the WHL study. First, it may be beneficial to implement future farm-to-school programs in smaller rather than larger school districts or in districts whose production facilities are more decentralized. Kloppenburg and colleagues also find that if locally purchased produce is to be used in school meals, it must arrive ready to use. This is likely to be the case for most school food services across the country and overcoming this barrier will be a requirement for most FTS programs.

Like the Kloppenburg study, the issue of processing came up time and time again throughout our research. Typically, school food service operations receive the majority of their produce in ready-to-use form. Even for those schools with on-site kitchens, constraints such as limited time and small staffs make the option of processing whole, fresh ingredients impossible. If local ingredients are ever going to represent a large portion of school meals, they need to arrive in processed form. To address this issue, one option we have considered is that of a central processing kitchen – a place where growers could bring their product to slice, freeze, and package. This option is one that could potentially help alleviate many of the other obstacles that face the farm-to-school movement, as well. The problem of seasonality could be partly eliminated if cold storage and freezers were available to growers with excess produce. Distribution issues could be alleviated if a processing facility had some method of delivery. A central processing facility could also help with the issue of supply – while one farmer alone might not be able to provide enough of an item to supply a school district, this could be easily accomplished through a cooperative effort. The issue of price still remains, however. The added cost of processing would likely be added on to the consumer, or in our case the food service operations; at least for the time being. Over time, however, a central processing kitchen would allow farmers to process produce that might otherwise go to waste – produce they aren't able to sell at farmers markets, for example.

If growers were able to significantly increase the amount of food they could sell due to the processing kitchen, they might be able to charge a more competitive price for those products.

In order for a processing facility to be successful, however, certain challenges must be met. A successful facility requires some level of management. A manager is necessary not only to coordinate producers, but also to ensure the proper use of equipment and to enforce certain safety and health standards. Of course, much of the success of a processing facility depends on the level of utilization. Only if enough producers utilize the facility will it remain operational. Later, we will discuss one such facility located in Wadena, MN, and its potential impact on farm-to-school projects in Region Five.

Methods

In light of our study objective and findings from previous research, the methods developed for this study address the following questions:

- What products are schools currently purchasing (and at what price)?
- What products are being grown by local producers (and in what quantities)?
- What products have the greatest potential for use in farm-to-school programs?
- What impact will increased sales to school districts have on farm production and marketing decisions?
- What are the economic inputs and outputs of agricultural production?
- What challenges face Farm-to-School programs in Region Five?

The answers to these questions, among others, will provide us with a more complete picture of farm-to-school programs and their value for the local economy.

Data Methods

We collected information from food service directors, growers, and community kitchen directors through the use of surveys and one-on-one interviews. We also spoke with a number of farm-to-school experts, including Lynn Mader (Farm-to-School Consultant for the Regional Sustainable Development Partnerships), Ryan Pesch (University of Minnesota Extension Educator), JoAnne Berkenkamp (Local Foods Program Director at the Institute for Agriculture and Trade Policy), and Cindy Tong (Post-Harvest Physiology expert from the University of Minnesota's Department of Horticulture).

Food service directors were asked about purchasing patterns, current distributors, pricing, lunch participation rates, serving sizes, and processing capabilities, as well as the directors' opinions on farm-to-school's potential benefits and their perceptions about local foods. Growers were asked about the current size of their operation, whether they would increase production to meet additional demand for local schools, about pricing for school sales versus direct market sales, and about their processing capabilities. Responses were collected and the average price per pound of each item was calculated.

Participants

In order to estimate the potential demand for all school districts in Region Five, we surveyed three school districts, with varying degrees of farm-to-school interest and experience. These schools represent a cross-section of the region, as they range in size from five hundred students to over three thousand. Although one of the schools is not located directly in Region Five, we included this district in the study because of their wealth of experience in the farm-to-school program. Their food service operation has been purchasing locally grown products since 2005, the longest of any school in the area, and we felt that their feedback would be beneficial to our study. The other schools have had varying degrees of involvement in farm-to-school programs. One of the food service directors we interviewed has showed interest in a farm-to-school program but has not yet begun purchasing local ingredients. The other is interested in the benefits that farm-to-school programs provide but unsure whether the program would be feasible at her school. Working with a small

number of schools also gave us the ability to speak with food service directors and learn more about opportunities and challenges associated with farm-to-school programs.

To find interested growers in the region, we contacted a group of about thirty farmers who had participated in a survey earlier in the year. The purpose of that survey, administered by the Pine and Lake Country local foods program, was to identify existing and potential growers in the Central Minnesota region, and to find producer needs and interests (PLC Grower Survey). The growers we contacted had stated that they were either currently selling to schools directly or through a wholesaler, or were interested in expanding their market to include institutions (schools, hospitals, etc). We got feedback from eleven producers¹. Their feedback will be discussed later in the report.

Products

Many factors need to be considered when determining which products are potential candidates for a place in the farm-to-school repertoire. We must not only consider what the schools would like to buy, but also what the farmers are willing (and able) to sell. Obviously, Minnesota enjoys the full extent of the four seasons. Unfortunately, this means that when many products are available to purchase from local growers, schools are not in session. Conversely, certain products (such as spring greens) might be available before schools adjourn in the spring, but the price that farmers could receive by selling direct is so much higher than what the schools could afford to pay, that it isn't realistic to expect these items to be popular among farm-to-school programs. Our best option is to focus on those products that are available late into the fall and throughout the winter, and that are still reasonably priced. We began with a list of items currently used by the St. Paul Public Schools, one of the leaders in the state for farm-to-school in Minnesota. This initial list included sweet corn, potatoes, tomatoes, squash, carrots, cabbage, onions, apples, melons, oatmeal, wild rice, beef hot dogs, and bison. We included all of these items in the survey we sent to the food service directors. They returned with a much smaller list: potatoes, carrots, sweet corn, cabbage, apples, oatmeal, wild rice, and beef hot dogs.

¹ As our study was conducted during the summer months, it was quite difficult to get in touch with both producers and food service directors. A study conducted during the winter months might benefit from a greater pool of participants.

For various reasons, including students' distaste for certain foods, or the amount of processing necessary, the other items were eliminated.

Feedback from Food Service Directors

Some interesting themes emerged throughout our interviews with the participating food service directors.

Overall, the directors seem excited about the idea of a farm-to-school program. Some see farm-to-school participation as a way to support their local economy, while others are motivated by its perceived health benefits. Everyone we interviewed considered "local" farms to be within fifty miles of their school. We were surprised by the limited amount of fresh produce the schools currently purchase. While potatoes and apples are commonly used in whole, fresh form, other products such as carrots, cabbage, and sweet corn are used fresh occasionally, but all come processed (carrots were in "baby" form, cabbage was shredded, and sweet corn was pre-shucked). Other items, such as squash and melons were deemed too difficult to prepare. And some items are simply not purchased because of the students' distaste for them, such as raw onions and tomatoes. Instead, these are mostly purchased dehydrated or canned, or purchased in very small quantities raw. Interviews with different schools may provide different results, but overall our participants stressed the importance of speed and convenience when determining their menus. Among the schools we surveyed, all of them have on-site kitchens, an adequate supply of processing equipment (knives, peelers, slicers) and a staff that is sufficiently trained to prepare whole fruits and vegetables. Therefore, the difficulty with processing fresh produce is not that of capacity, but of time and money. One common complaint in our conversations is that of fewer staff members and less available labor hours than in previous years. When asked about the possibility of cutting produce on-site, one participant stated that she and her staff used to chop carrots for carrot sticks, but due to budget cuts, she now purchases baby carrots instead. While all of the women interviewed said that they could process whole, fresh produce occasionally (for a special "local" meal, perhaps), they would not be able to dramatically alter their purchasing habits without an increase in the size of their staff. These findings present us with a clearer picture of the opportunities and challenges that face food service operations throughout the region. If more money was made available to these operations, either

through better participation, some sort of household tax, or simply an increase in the price of school meals, farm-to-school participation could take off, as the interest and the capability is there.

One of our participants is in the process of beginning her fifth year of farm-to-school participation. The feedback we received from her was very beneficial. Throughout these past few years she has tried a wide variety of products. All of the items in our study, as well as a few others, have been purchased. Some have been great successes. Others, she says, she would not try again. Some products that we did not incorporate in our study but that she recommends to schools participating in a farm-to-school project include bison hot dogs, dried beans, bulgur or other similar grains, and red potatoes, just to name a few. She also mentioned that due to the success of her school's farm-to-school project, other food service directors in the area have begun to contact her to "talk farm-to-school". Her advice to them: "Start small. Start with one ingredient that the kids are sure to like, such as apples. Use recipes that are simple and the students will enjoy. Use unusual ingredients as a side dish rather than a main course. And don't be afraid to do a little extra preparation for a special local meal." This kind of feedback, from directors experienced in farm-to-school issues, is invaluable to those schools just starting out. As more schools consider farm-to-school as an option, it is important that information like this be available to both advise and encourage them.

Feedback from Growers

A number of themes emerged from our interviews with growers. As we discussed earlier, the eleven farmers and farmer businesses we interviewed were selected based on their response in a previous survey – either that they were currently selling to schools or wholesale distributors, or that they were interested in expanding production to institutions. Therefore, all of the growers we spoke to were excited about the opportunity to participate in a farm-to-school project. All but a few growers stated that they would expand their current production in order to meet demand for farm-to-school products. Predictions for potential expansion ranged from as little as twenty percent to upwards of seventy five percent. One grower stated that their increased production would be based simply on what the schools demanded. "If they ordered a thousand pounds of carrots, that's what we would plant." The only growers who said that they would not increase production

were apple producers. One apple producer responded: “No, we would not increase our orchard. [It] takes nine years to produce a good quality apple. This program could be gone in that time.”

In our interviews, we asked growers about their processing capabilities and whether they would use a processing facility if it was available to them. All of the growers we talked to understood the importance of processing when selling to schools and institutions. Some have methods of processing currently available on-site, such as sorting and packing space or a walk in cooler. A few mentioned that they were in the process of developing a commercial kitchen, but none gave specifics on the size or capabilities of such a kitchen. When asked if they would use a cooperatively-owned commercial kitchen for post-harvest processing, answers were mixed. A few answered yes without hesitation. Others said that they would use a processing facility, but that they would not want to do the processing themselves. “Farmers don’t have the time to process. Or the money to hire someone to do it for them.” Some weren’t interested in using a central facility, because of their plans for developing a facility of their own.

Some of our respondents had concerns about the compatibility of Minnesota’s short growing season and farm-to-school sales. One grower complained “the growing window is just too small to justify sales to schools.” Another respondent suggested additional growing techniques such as a second planting of brassicas (broccoli, cabbage, cauliflower, etc...) later in the year, which would then be available to harvest during the first few months of school. But he also acknowledged that the price he could receive selling directly to consumers for such a product would probably be higher than what the schools would be able to pay.

The grower’s perspective is often overlooked in farm-to-school research. Therefore, we were grateful to hear about what excites growers about the project, as well as what concerns them. With plenty of feedback from both sides of the farm-to-school issue, projects such as these have a much greater chance for success.

Feedback from Community Kitchen Directors

For the purpose of our study, we looked at a community kitchen facility in Wadena, MN, which will begin operation within the next few months. The founders of the facility (a small non-profit called STEP – Stimulating Economic Progress) started it as a resource for small growers in the region, but the space will be available for both farmers and community members to rent on an hourly basis, for a small fee. STEP's goal is to help growers sell more product, with less waste. The facility will serve not only as a processing kitchen, but also as a marketing entity, so growers can connect with consumers more easily. The facility will begin production with a handful of products, including root vegetables, local fruit, and gluten-free bread, with the intention of expanding to a wider variety of items as demand and revenue increase. STEP's facility could be a great resource for growers interested in selling to schools and institutions, as it will have a cold storage facility, slicing and packaging equipment, freezers, and refrigerators. We will use STEP's facility as a model in our economic impact scenarios, which we will mention later in the report.

Another facility available to Region Five growers and school districts is the Whole Farm Co-op, located in Long Prairie, MN. Whole Farm is comprised of family farmers committed to the production of clean, nutritious food products and environmentally sound farming practices (Whole Farm website). While technically not a processing facility, it has been in the business of gathering and distributing a wide variety of local products for the past 12 years. Because of its large collection of growers, Whole Farm has the advantage of being able to fill orders from all over the state, and in recent years it has begun selling to a local school district. Schools prefer purchasing from a cooperative such as Whole Farm because it eliminates the need for multiple invoices and deliveries. Cooperatives considering sales to local school districts would benefit from using Whole Farm as a model for farm-to-school sales.

Analysis

Input-output accounting, such as the popular IMPLAN modeling system, describes commodity flows from producers to intermediate and final consumers. All purchases, including commodities, services, and wages

are taken into account, and the model produces a set of direct and indirect multipliers that describe the change in all regional industries due to a one dollar change in demand for the industry in question (Lindall and Olson, 1996 – Implan). Commodity flows are based on current data describing economic activities in regions all over the country. The IMPLAN database contains federal, county, state, and zip code economic statistics which are estimated by region, not from national averages and can be used to measure the effect on a regional or local economy of a given change or event in the economy's activity (Pearce, 1989).

While Input-Output modeling can be an invaluable tool for researchers, it is important to understand its weaknesses. A number of studies have looked at IMPLAN's strengths and weaknesses, and the most common errors to avoid. In their 2001 study, Crompton and colleagues discuss the common misuse of IMPLAN's three types of economic impact measures: sales (or output), personal income, and employment. Both sales and personal income are measured in dollars, and are often confused. While many studies use the total sales multiplier as a measure of the success of a project, it actually has very little practical value. The personal income multiplier is a much better measure of a project's benefit to the community, as it reports the effect of an extra unit of spending on the changes that result in level of residents' personal incomes. The employment multiplier is commonly used to measure the number of new jobs created by a project, but it can be exaggerated to include part-time or temporary jobs, or jobs filled by residents from outside the community. In a similar study, Swenson highlights some common mistakes among input-output users. According to him, the most common error researchers make is assuming a cause and effect relationship. While the input-output models are designed carefully to be a predictor of what should happen given specific circumstances, they are not error-proof. The economy does not always act in a predictable manner, and researchers should not assume that it does. Used properly, with careful consideration of the complex relationship between producers and intermediate and final consumers, input-output modeling can be a very valuable tool to help predict economic effects regionally.

IMPLAN contains information on 440 industrial sectors, from oilseed farming to performing arts companies. Information is also available on the relationships between each industry. An industry balance sheet measures

what percentage of each dollar spent in one industry goes to all other related industries. For example, for every dollar currently spent on vegetable and melon farming in Region Five, just over fifty cents of it goes toward “Value Added”, which includes Employee Compensation, Proprietary Income, Other Property Type Income, and Indirect Business Taxes. The remaining forty eight cents is spent on inputs; from tire manufacturing to legal services and everything in between.

For the purpose of our study, we will create four new farm-to-school (FTS) industrial sectors: Vegetable FTS, Fruit FTS, Meat FTS, and Grain FTS. These new sectors are introduced by altering four sectors that would otherwise be unused in the region. The unused sectors include cotton, tobacco, tree nut, and sugarcane farming. By introducing some basic assumptions about the industry, and adding expected technical coefficients for purchases in the local economy and for payments to production factors, we can measure the economic effects a regional farm-to-school industry would have on all of Region Five. We will model our technical coefficients on current, corresponding IMPLAN sectors (Vegetable FTS will be based on the Vegetable and Melon Farming sector; Fruit FTS on Fruit farming; Meat FTS on a combination of Cattle Ranching and Farming, Meat Processing, and Wholesale Trade; Grain FTS on Grain farming). Typically, the five largest technical coefficients encompass the majority of the inputs for any given industry, so by using the five largest coefficients from each of our corresponding IMPLAN sectors, we will capture the essence of the four farming industries. Then, we will modify the technical coefficients slightly, to match what farm-to-school farmers are doing in the field, as compared to the farmers in the corresponding sectors².

In order to modify the technical coefficients, we first need to understand what is different about our new FTS sectors as opposed to IMPLAN’s original farming sectors. As we mentioned earlier, IMPLAN data is based on a combination of regional, state, and national government statistics. In regions where available data isn’t adequate, state (and sometimes national) data will supplement what is available to create a more complete picture of the activities in the region. Using information from Minnesota’s agricultural statistics, we can determine the amount of fresh market produce that is sold direct versus wholesale throughout the state.

² The exact estimates for the technical coefficients will not be provided here, but will be estimated during IMPLAN analysis and included in the final report.

While many farmers in Region Five, as well as the state of Minnesota, are small and sell mostly direct to consumers, the bulk of the sales volume in the state is actually wholesale. Therefore, we can assume that the estimates used in the original IMPLAN sectors will be more similar to wholesale. The two main differences, then, between our FTS farmers and the farmers in IMPLAN will be transportation and processing. FTS farmers will require more transportation than a typical wholesale farmer, as they will make more deliveries, more frequently. FTS farmers will also do more processing than wholesale producers. These two differences mean that FTS farmers will use more labor and more processing costs, resulting in reduced proprietor income.

Demand Assumptions

Earlier, we mentioned the MNSA study, which surveyed food service directors throughout the state of Minnesota. Based on the results of that study (of the schools surveyed, 73.8 percent had an on-site kitchen, 3.1 percent had a central production kitchen, 1.5 percent had a satellite kitchen, and 21.5 percent some combination of the three), we can safely assume that nearly all of the schools in our study area have the capability to prepare meals from scratch.

In addition to the information on on-site kitchens, the MNSA study had important data on the number of breakfasts and lunches served per day for each of the schools in their study. Using this data, collected from over sixty schools throughout the state, as well as information on the number of students eligible for free and reduced price meals and the total number of students enrolled in the Region Five counties³ (Minnesota Department of Education), we were able to model two regressions: one with the percentage of students eating lunch each day as the dependent variable, and one with the percentage of students eating breakfast each day as the dependent variable. Both models used the percentage of students eligible for free or reduced price meals as the independent variable. We were then able to use these models to estimate the percentage of school meals served per day for the entire Region Five district. The results of that regression are below.

³ According to the Minnesota Department of Education's website, 25,840 students were enrolled in Region Five in the 2008-2009 school year. This number includes all grades, pre-K through 12.

Percentage of students eating breakfast⁴

$$\begin{aligned} Y &= -0.032143726 + 0.006467437X \\ R\text{-square} &= 0.482720551 \\ \text{Standard Error} &= 0.114517436 \end{aligned}$$

Estimated total number of Region Five students eating breakfast daily = **7,417**

Percentage of students eating lunch⁵

$$\begin{aligned} Y &= 0.694769812 + 0.001315075X \\ R\text{-square} &= 0.042235979 \\ \text{Standard Error} &= 0.106175957 \end{aligned}$$

Estimated total number of Region Five students eating lunch daily = **19,294**

The annual budget for the region was estimated using information from a 2006 study on the feasibility of using more local foods in Minnesota's schools (Berkenkamp), and from personal communication with the author. She found that approximately 40 percent of the cost of a school lunch goes toward food. The remaining 60 percent goes toward labor costs and overhead. According to Berkenkamp, the average food component cost is \$1.15-\$1.25 per lunch nationally. Taking into consideration the influence of the lower cost for free meals and for elementary lunches (\$0.90 per lunch), this average drops to approximately \$1.00 per meal. For breakfast, the price is closer to \$0.70. Multiplying the number of students eating lunch daily in the region (19294) by the average number of school days per year (171) and the cost of the food component of each meal (\$1.00), we get a predicted annual lunch budget of \$3,299,445. For breakfast costs, we multiply the number of students eating breakfast daily in the region (7417) by the average number of school days per year (171) and the cost of the food component (\$0.70) to get an annual budget of \$886,977. The two combined give us a total annual food budget of \$4,186,422.

In order to quantify the issue of processing, we used USDA conversion factors to estimate the difference in weight between the growers' whole fresh product and the finished product, post-processing. These estimates,

⁴Standard errors for the breakfast parameter estimates: $\beta_0=0.030652015$, $\beta_1=0.000836868$

⁵Standard errors for the lunch parameter estimates: $\beta_0=0.028676412$, $\beta_1=0.000782796$

combined with information on typical distributor mark-up values (we used a 25% mark-up for our calculations) allowed us to estimate the price growers might charge if they were required to process certain items before delivering them to schools.

As a final point, based on information gathered throughout our research, we will make two additional assumptions. First, we will assume that all production for the farm-to-school sector will be new production, on currently unused land. While this assumption would not hold if the sales volume were to reach a very high level, the total new production for our new farm-to-school industries is still small enough that it is a reasonable assumption to make for our study. The only exception is apples. The apple farmers we interviewed responded that they would not increase production but rather would take from other sales to sell to schools. Therefore, we will assume a positive shock to FTS fruit, but an equal negative shock for fruit farmers, resulting in no net change in the case of apple sales. Second, we will assume that there is no loss to current wholesalers, as they are not located in the region. If we were to expand our study to include a larger area, this would have to be altered. But because all of the distributors our schools currently purchase products from are located outside of Region Five, it is safe to assume that the loss of sales they would see will not have a negative effect on Region Five wholesalers. Later, during our IMPLAN analysis, we'll test what the negative impact might be if a distributor was located within the region or nearby, and what that could mean for our results.

IMPLAN Scenarios – Utilization and Pricing

Earlier, we mentioned some of the barriers that face farm-to-school projects. Among these, we found processing and price to be the most overwhelming. Therefore, we have specified three utilization scenarios and three pricing options to analyze using IMPLAN. Each utilization scenario incorporates a different level of demand for local products, and the three pricing options reflect the potential spending levels, as well as areas where taxes might be required. Using each of the three utilization scenarios in combination with the pricing options, we can see which combination has the greatest economic impact, which is the most feasible for schools just beginning a farm-to-school project, and which has the best chance for the long-term viability

of the farm-to-school program in Region Five. Through our interviews with participating food service directors and growers, we were able to estimate the following: the average price paid by the schools for each item (carrots, sweet corn, cabbage, potatoes, apples, wild rice, oatmeal, and beef hot dogs), the median wholesale price charged by the growers for each item, the average number of servings per pound for each item, and the average number of times each item is served during the school year. These values were the basis for our utilization and pricing estimates.

Utilization Scenario One (Special Meal)

In this scenario, we will assume that each school in Region Five participates in one special event lunch per ingredient per school year (called “SM” in Table 1), each featuring one of our highlighted ingredients (for a total of eight special lunches throughout the year). Here we are assuming farmers provide all ingredients in their whole, fresh form, and that the schools are responsible for all processing. Therefore, all pounds reported for this scenario are given in unprocessed farm weight. For most ingredients (apples, potatoes, wild rice, oats, and hot dogs), the unprocessed weight and the weight the schools demand is equal. However, for carrots, sweet corn, and cabbage, some conversion is necessary to determine the amount of unprocessed product necessary to supply schools with enough food for all students. We used USDA conversion information to determine the amount required for these items. The processed weight for cabbage (shredded) is 80 percent of the whole head. A shucked ear of sweet corn weighs 88 percent of an unshucked ear. Peeled and trimmed carrots are 81% of their unprocessed weight⁶. Using this information we were able to alter the number of servings per pound for each of these items to provide a more accurate amount demanded for the unprocessed items. Then, we simply divide the number of students eating lunch (or breakfast) daily in the region by the number of servings per pound (farm weight) to estimate the amount required for one special meal per item.

⁶ Because schools do not currently purchase unprocessed versions of these products, we used the processed equivalent to estimate the number of servings per pound (farm weight). For the case of carrots, we used “carrots/processed” (or baby carrots) as they are closest to the whole fresh form.

Utilization Scenario Two (Unprocessed Substitution)

In the second scenario (Un-S), we will assume that each school in Region Five substitutes a certain percent of their current purchases for local product. To determine the volume necessary for this scenario, we assume full substitution for the entire school year for all items that do not require any processing (apples, potatoes, wild rice, oatmeal, and hot dogs). Then, to estimate the total pounds required for each item, we divide the number of students eating lunch daily by the number of servings per pound, and multiply this amount by the average number of times each item is served per year.

Utilization Scenario Three (Substitute All)

In our final scenario, we will assume that the growers in Region Five have access to a central community kitchen, where they are able to do post-harvest processing of their product. This scenario allows for greater viability of the farm-to-school project, as many schools cannot do the necessary processing on-site due to small staffs and time constraints. Like the previous scenario, we are assuming full substitution for all items for one year. The method used to calculate total demand is identical to the one used in the Unprocessed Substitution scenario, with one minor exception. Because we are assuming that farmers will be doing processing for the schools, for those items that require processing (sweet corn, cabbage, and carrots), we divide the total number of students eating lunch daily by the number of servings per pound *farm weight*. This ensures that farmers are producing enough pre-processed product to supply schools with an adequate amount after processing. Therefore, the final column lists the total pounds of raw unprocessed product necessary to produce the equivalent amount of each item.

Table 1 – Pounds Demanded for Region Five schools (19294 lunches and 7417 breakfasts daily)

Product	Srvgs/lb	Srvgs/lb (FW)	Svd/year	SM	Un-S	S-All
Carrots/Whole		11.74		1642.93		
Carrots/Processed	14.44	11.74	13.50			18032.00
Carrots/Canned	5.80	4.36	6.00			19951.23
Carrots/Frozen	5.78	3.17	10.50			35062.23
Sweet Corn/Shucked	8.53	7.54	2.33			5972.75
Sweet Corn/Unshucked		7.54	0.33	2559.75		
Potatoes/Russet	1.93	1.93	19.00	9979.40	189608.53	189608.53
Apples	4.12	4.12	31.50	4681.94	147481.15	147481.15
Cabbage/Whole		6.86		2250.91		
Cabbage/Shredded	8.57	6.86	37.50			105511.33
Beef Hot Dogs	8.00	8.00	5.33	2411.69	12862.33	12862.33
Oatmeal	4.24	4.24	6.67	1751.33	11675.54	11675.54
Wild Rice	104.84	104.84	2.33	184.03	429.40	429.40

Table 1 shows the number of pounds necessary for each product under each of the three utilization scenarios. Column two lists the average number of servings per pound schools use for each product, and column three lists the equivalent number of servings per pound using the “farm”, or unprocessed, weight for each product. One can see that the only items affected are those that require some level of processing. Column four lists the average number of times each item is served during the school year. The final three columns list the number of pounds required for each of the three utilization scenarios. Many of the items are not demanded in each scenario. In these cases, the amount demanded is left blank. For example, in the second scenario (Unprocessed Substitution), only those items that do not require any processing are included in the total volume. In the third scenario (Substitute All), all items are included. For those items that require processing, the farm weight (or unprocessed weight) is included, but farmers are assumed to do the processing necessary to supply each of the items listed.

We were curious to see if the growers in the region would be able to supply the amount of product necessary to meet the schools’ demands. For certain items, such as wild rice and sweet corn, it seems as though there

would be no issue whatsoever. The eleven growers we interviewed (only a small percentage of the growers in the region) already produce more than the amount necessary to feed all the students in the region for the entire school year. For other items, such as potatoes and carrots, which are used quite often throughout the school year, the volume demanded is quite high. It might be more difficult for the growers in the region to increase production by the amount required to meet demand. However, using available information on typical yields for the state of Minnesota (USDA), we can estimate the total number of acres required to produce the volume demanded for any item. Even for potatoes, which are by far the product with the highest volume demanded, only 4.8 acres would be required to meet the entire farm-to-school demand for all of Region Five's schools for the year. Considering that nearly 2,000 acres of potatoes were harvested in Region Five in the year 2007 (Minnesota Department of Agricultural Statistics, 2009), it seems likely that this demand could be met.

Pricing Option One (School Price)

In the first pricing option, we will assume that all products are sold at current, wholesale prices. The schools devote the same amount to their food budget, and the farmers typically receive less for their product. Occasionally, farmer's prices might be lower than the prices schools currently pay, in which case the schools pay what the farmers charge (this holds true for each pricing scenario). With the first pricing option, we adjust the production function to reflect lower proprietary and property income (farmers lose some profits). Since school spending doesn't change, there is no additional spending on the part of the households.

Pricing Option Two (Farm Price)

In pricing option two, we will assume that the schools in Region Five purchase the local product at the growers' asking price. In this case, we adjust the production function to reflect higher income to the farmer. We will also impose a "tax" on households – accomplished by decreasing household spending by some factor. This tax can be determined by calculating the difference between the total amount schools currently pay for our selected products and the total amount paid using the new "grower's price", and dividing by the

number of households in the region. The tax could either be in the form of an increase in property tax on citizens of Region Five, or through an increase in school lunch prices, which would be passed on to the students' parents. The method of "taxation" will not affect the results of the analysis.⁷

Pricing Option Three (Intermediate Price)

For the third pricing option, the prices paid for the local products will be halfway between the schools' average price paid and the growers' median cost. In cases where the farm price is lower than the school price, the intermediate price has been changed to match the farm price. For the Intermediate pricing option, we will assume a moderate decrease in current income to farmers (thus assuming the farm-to-school sectors would return on average, profits slightly less than what they get now) and a moderate tax to households, in the form of an increase in property taxes or an increase in the price of school lunches.

Table 2 – Prices

Product	Srvgs/lb	Srvgs/lb (FW)	\$/lb	\$/lb (farm)	\$/srvg	\$/srvg (farm)	\$/srvg (Mid)
Carrots/Whole		11.74		\$0.86		\$0.073	\$0.073
Carrots/Processed	14.44	11.74	\$1.69		\$0.117	\$0.091	\$0.091
Carrots/Canned	5.80	4.36	\$0.60		\$0.104	\$0.246	\$0.175
Carrots/Frozen	5.78	3.17	\$0.61		\$0.106	\$0.338	\$0.222
Sweet Corn/Shucked	8.53	7.54	\$1.20		\$0.141	\$0.086	\$0.086
Sweet Corn/Unshucked		7.54		\$0.52		\$0.068	\$0.068
Potatoes/Russet	1.93	1.93	\$0.30	\$0.68	\$0.154	\$0.350	\$0.252
Apples	4.12	4.12	\$0.70	\$0.69	\$0.171	\$0.167	\$0.167
Cabbage/Whole		6.86		\$0.50		\$0.073	\$0.073
Cabbage/Shredded	8.57	6.86	\$0.61		\$0.072	\$0.091	\$0.081
Beef Hot Dogs	8.00	8.00	\$2.08	\$3.48	\$0.260	\$0.435	\$0.347
Oatmeal	4.24	4.24	\$0.60	\$0.71	\$0.143	\$0.167	\$0.155
Wild Rice	104.84	104.84	\$4.87	\$6.50	\$0.046	\$0.062	\$0.054

⁷ The method of taxation would affect the distribution of impacts, but this is outside the scope of the IMPLAN model.

Table 2 has information on the average price schools currently pay and the median wholesale price farmers would charge for each product in our study (columns four and five). The final three columns represent the three pricing options discussed above. SP represents the price per serving the schools currently pay, FP the price per serving charged by the farmers, and IP the intermediate price per serving.

In this table, the farmers' price per serving and the schools' price per serving are shown side by side for each item. For items where only one price is shown, the corresponding item is not currently purchased by schools. You can see that for some items, such as oatmeal and apples, the prices are quite comparable. In some cases, such as processed carrots and shucked sweet corn, the estimated farmer price is actually lower than what schools currently pay from distributors. For others, such as wild rice and beef hot dogs, the price farmers charge is almost double what the schools currently pay. The issue of processing becomes quite clear when looking at this chart. While some items are quite competitive in price when comparing the whole ingredient with its processed alternative, others are not even close. Pre-shucked sweet corn, for example, appears to be less expensive purchased straight from the grower than from a distributor, even when including processing costs, while canned and frozen vegetables don't seem to be very cost-effective when compared with distributors' prices.

Results

Using the information we gathered from our interviews with participating food service directors and growers, along with the information on school lunch participation derived from the MNSA study, we were able to estimate a total annual expenditure for each item for the entire region under each utilization and pricing scenario. Table 3, below, shows the nine combinations of utilization and pricing scenarios, and the total dollar value each would have annually.

In the Special Meals scenario, we're assuming each school district in Region Five is hosting one special event lunch per ingredient throughout the school year. The three pricing scenarios represent the expenditure for each item. In the case of the special event lunch, we are also assuming that the schools would assume all

processing responsibilities, and the farmers would sell the products in fresh, whole form. The Unprocessed Substitution scenario assumes that schools substitute a certain percentage of their purchases from local farmers (in this table we're assuming full substitution for one year). Under this scenario, we assume that farmers have no processing capabilities. Therefore, only items that don't require processing are shown. Again, the three pricing scenarios show expenditures based on the three different prices paid for each item. The Substitute All scenario assumes that schools in Region Five substitute a certain percentage of their purchases from local farmers (again, the graph shows full substitution for one year). However, under this scenario, we assume that the growers in the region have access to a central processing kitchen and are willing to use it. Therefore, all items are included, as farmers would be able to provide processed, ready-to-use ingredients. At the bottom of Table 3, the percentage of the annual budget for the region is listed for each utilization-price combination.

Discussion

The Special Meals (SM) scenario has a number of benefits over the others. Because it requires no processing on the part of the farmers and only requires food service directors to plan one special event meal per ingredient per year (eight special meals total), it is by far the easiest of the three to carry out. It is also a great starting point for food service directors who are interested in starting a farm-to-school program but are unsure of where to begin. However, the volume of local product necessary to serve one special meal per ingredient per year is so small that the amount of money introduced into the local economy is not particularly significant. Even the Special Meal scenario where schools pay the farmer's price only represents about 0.58 percent of the region's annual food budget.

Like the SM scenario, the Unprocessed Substitution (Un-S) scenario has the benefit of no processing on the part of local farmers. Also, the dollar amount introduced into the economy from substituting local products for ones normally purchased through a distributor is much greater than from merely serving one special event meal per item per year. In fact, in the case of certain ingredients, the difference can be enormous. For

Table 3 – Utilization and Pricing

Utilization	SM	SM	SM	Un-S	Un-S	Un-S	S-All	S-All	S-All
Pricing	SP	FP	IP	SP	FP	IP	SP	FP	IP
Carrots/Whole	\$2,261	\$1,145	\$1,703						
Carrots/Processed							\$30,529	\$23,764	\$27,146
Carrots/Canned							\$12,058	\$28,431	\$20,244
Carrots/Frozen							\$21,406	\$68,371	\$44,889
Sweet Corn/Shucked							\$6,340	\$3,850	\$5,095
Sweet Corn/Unshucked	\$2,717	\$1,167	\$1,942						
Potatoes/Russet	\$2,974	\$6,736	\$4,855	\$56,507	\$127,986	\$92,246	\$56,507	\$127,986	\$92,246
Apples	\$3,296	\$3,222	\$3,259	\$103,824	\$101,481	\$102,652	\$103,824	\$101,481	\$102,652
Cabbage/Whole	\$1,381	\$1,125	\$1,253						
Cabbage/Shredded							\$51,803	\$65,945	\$58,874
Beef Hot Dogs	\$5,009	\$8,393	\$6,701	\$26,715	\$44,761	\$35,738	\$26,715	\$44,761	\$35,738
Oatmeal ⁸	\$1,057	\$1,243	\$1,150	\$7,040	\$8,289	\$7,664	\$7,040	\$8,289	\$7,664
Wild Rice	\$896	\$1,196	\$1,046	\$2,091	\$2,791	\$2,441	\$2,091	\$2,791	\$2,441
Total Veg&Melon	\$9,334	\$10,173	\$9,754	\$56,507	\$127,986	\$92,246	\$56,507	\$128,375	\$92,441
Total Fruit	\$3,296	\$3,222	\$3,259	\$103,824	\$101,481	\$102,652	\$103,824	\$101,481	\$102,652
Total Grain	\$1,953	\$2,440	\$2,196	\$9,130	\$11,080	\$10,105	\$9,130	\$11,080	\$10,105
Total Meat	\$5,009	\$8,393	\$6,701	\$26,715	\$44,761	\$35,738	\$26,715	\$44,761	\$35,738
TOTAL	\$19,592	\$24,227	\$21,910	\$196,176	\$285,308	\$240,742	\$318,313	\$475,668	\$369,991
% of Annual Budget	0.47%	0.58%	0.52%	4.69%	6.82%	5.75%	7.60%	11.36%	9.48%

⁸ Because oatmeal is most often served as a breakfast, we calculated all demand for oatmeal using the estimated total number of students eating breakfast daily (7,417). The demand for all other products was calculated using the estimated number of students eating lunch daily (19,294).

example, the potential dollar amount spent on potatoes in the SM scenario is just over \$6000. In the Un-S scenario, that number jumps to over \$120,000. While it is probably not possible for a school just beginning a farm-to-school project to substitute every potato with one from a local grower, it is important to note the striking difference between the two options. The portion of the region's food budget dedicated to local product in the Un-S scenarios is much larger than in any of the SM scenarios. For example, the Unprocessed Substitution scenario with the lowest dollar amount (where school spending doesn't change) represents 4.69 percent of the region's food budget, while the Special Meals scenario with the same pricing option represents only one half of a percent of the budget. Considering the fact that this scenario does not require any processing on the part of the schools, it is a good option for schools interested in increasing their local purchases.

The Substitute All (SA) scenario has, by far, the greatest economic impact in terms of dollars spent locally. This scenario, combined with the pricing option where schools pay the current farmer wholesale price, could potentially increase the percentage spent on local product to over 11 percent of the region's annual budget. This scenario assumes the use of a central processing kitchen, which could provide additional economic activity in the region, through value-added agricultural products and more local jobs. However, because of the processing requirement, the third scenario is also the most difficult of the three to implement. Furthermore, the central processing kitchen has a number of potential drawbacks that could hinder its success. Significant cooperation between growers, schools, parents, and community leaders would be necessary for an ambitious project such as this.

Future Areas of Research

Although farm-to-school programs are being implemented in increasing numbers of school districts in Minnesota, there is no current research available on the potential economic impacts that farm-to-school programs can have for their school district, their county, and the state of Minnesota. The information in this study will help school food service directors and superintendents better understand the potential returns

associated with investments in farm-to-school programs within their school districts. Much more research is needed, however, on this issue.

Throughout our research, we learned how important the issue of processing is when discussing farm-to-school success. More information is needed on existing processing facilities, so we can better understand what makes some succeed and others fail. More details about the costs, challenges, and capabilities of successful operations can help fill this critical gap in farm-to-school research.

Finally, similar studies could benefit from an expanded scope. Including a larger region in the analysis, or perhaps the entire state of Minnesota would provide more meaningful results. Also, interviewing more schools could provide greater results as well. More feedback from schools might increase the list of products demanded, and would give a more accurate picture of average prices and serving sizes.

Conclusion

Many of farm-to-school's positive impacts are well-documented: healthier lunches, improvement in students' attitudes about food, increases in school lunch participation, and improvement in student behavior, just to name a few. This study provides much-needed information on a different subject: farm-to-school's positive economic impacts. Through the use of surveys and one-on-one interviews, we were able to quantify the economic impact a large-scale farm-to-school project would have on Minnesota's Region Five. The results were mixed. There are a number of barriers facing the farm-to-school movement that must be addressed if it is to gain widespread success. But there is also potential for genuine economic growth. Effort must be made on the part of school districts, parents, farmers, and community leaders in order for farm-to-school projects to succeed. Increased knowledge about all of farm-to-school's benefits (social, health and economic) must be promoted. Only then will all of farm-to-school's potential impacts be realized.

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